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ABSTRACT

A structured keyboard skills training scheme for students in England should be included within school curricula. Negative attitudes toward keyboard training prevail in schools although employers value keyboard application skills. There are several reasons why keyboard proficiency, which facilitates the efficient input and retrieval of text and data, is needed in today's technologically advanced society: imputing and extracting text and data is a fundamental part of information technology; there is a need for efficient text input skills; and these skills enable the highest standards of text presentation available. Structured training in the skill is required because touch-typing is a complex psychomotor skill; systematic teaching in schools prevents picking up bad habits. In devising a strategy to provide training in schools, several points should be considered: (1) keyboard skills should be developed and monitored so they are shared through curriculum areas; (2) teaching staff should acquire keyboard training; (3) positive images of keyboard use enhance student motivation; (4) proficiency should be developed in all students; and (5) only basic equipment is needed. (Four appendices contain reviews of keyboard training software packages, keyboard training scheme at The Thomas Telford School, some models of delivery, and institutions offering keyboard skills training for adult students. (NLA)

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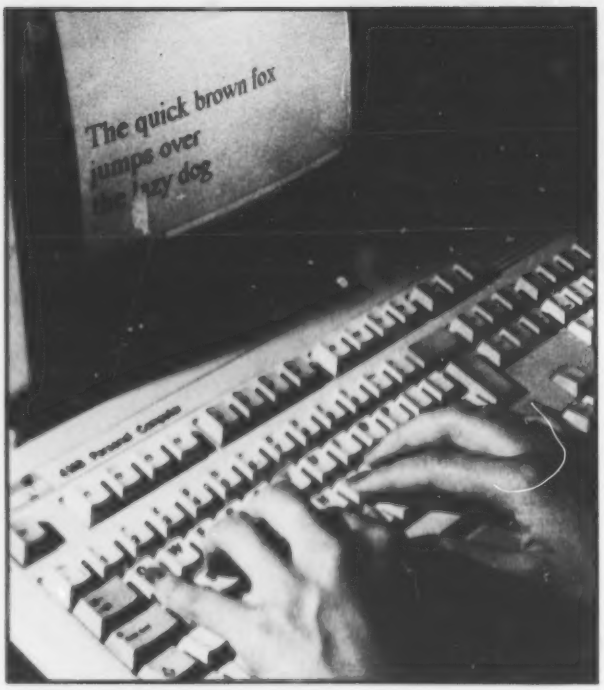

Keyboard proficiency: an essential skill in a technological age

Eve Gillmon

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Keyboard proficiency: an essential skill in a technological age

Eve Gillmon

Number 2 in a series of CTC Trust publications.
General Editor Dr Helen Sharp.

The author

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Preface

Many people in today's society are expected to interact with computers during the course of their work. In particular, the ability to input and extract data via a keyboard is no longer confined to clerical staff but is a highly valuable skill for people at all levels of an organization. Whether or not QWERTY keyboard skills training should be provided within a school's curriculum is a controversial issue within the education world, but employers are unanimous in their demand for the skill at all levels.

Educators have a key role to play in developing the computer-literate citizens of the future, and therefore need to re-examine some traditional attitudes and priorities in relation to relevance, access, timing and teaching methods for computer keyboard skills.

The main body of this paper puts forward the case for investing adequate curriculum time in keyboard skills training. It is offered as a contribution to the debate and to assist curriculum planners in considering ways and means of providing all students with a level of skill which will liberate them to interface with the communication tools around them. In the skilled workforce which Britain urgently needs to develop, technological capability will include the ability to use such tools effectively and efficiently in every aspect of life and work.

The document's appendices provide information about training methods and courses, including details of ten software packages which are designed to teach keyboard skills, and a description of a training scheme at The Thomas Telford School which reflects the ideas expressed in this paper. Any institution seeking to include keyboard skills training in their curriculum should find them an invaluable source of information and ideas.

Susan Fey
Chief Executive, CTC Trust

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Comments from former teaching colleagues in Hampshire and from staff at Bradford and Djanogly CTCs were invaluable, as has been consultation with Bernice Hill from Pitman Examinations Institute. I acknowledge particularly the willing co-operation of staff at The Thomas Telford School who have enthusiastically subjected themselves to keyboard skills crash training courses whilst simultaneously moving premises and receiving their first pupil intake.

To all of the above, and to many students whose experiences have informed my thinking, I am grateful.

Eve Gillmon
Curriculum Development Director
(Business Education)

Glossary

The following abbreviations are used in this document:

CDT	Craft, Design and Technology;
GEST	Grants for Education Support and Training;
ROSLA	Raising Of School Leaving Age;
QWERTY	The keyboard with 'q', 'w', 'e', 'r', 't' and 'y' as its first six letters.
TVEI	Technical and Vocational Education Initiative.

Summary

All schools and colleges where the use of Information Technology throughout the curriculum is encouraged should provide keyboard skills training for all their students.

The main body of this paper puts forward the case for including a structured keyboard skills training scheme for Year 7 pupils within a school's curriculum. The author argues that a radical change of attitude is needed and the techniques and resources necessary to achieve this goal are discussed.

The following key points are made:

- Negative attitudes towards keyboard skills training prevail in schools. Employers, however, consistently include it in lists of qualities which they would consider to add value to an application;
- Keyboard proficiency, which facilitates the efficient input and retrieval of text and data is needed by everyone in today's technologically-advanced society for the following reasons:
  - The ability to input and extract text and data is a fundamental part of Information Technology capability;
  - Advances in communications technology have created a need for efficient text input skills in all walks of life;
  - The use of word processor and desktop publishing packages enables the highest standards of text presentation to be available to everyone.
- Structured training in the skill is required for the following reasons:
  - Touch typing is a complex psycho-motor skill;
  - Allowing students simply to 'pick up' the skill leads to bad habits which are notoriously difficult to correct later.
- Training should be provided in schools because:
  - If pupils are expected to use Information Technology, then they should be enabled to use it as efficiently as possible;
  - Training pupils at an early age will avoid the acquisition of bad habits, and once correct techniques are learned, they will remain for life.
- In devising a strategy to provide training in schools, the following points should be considered:
  - School management teams should develop a policy towards the provision for such skills so that responsibility for the development and monitoring of keyboard proficiency is shared throughout curriculum areas;
  - All teaching staff should be enabled and encouraged to acquire keyboard skills training;

- Positive images of keyboard use, i.e. across a range of occupations, should be promoted in order to enhance student motivation;
- Keyboard proficiency should be developed in all students from the earliest possible age, and certainly no later than entry to secondary school;
- The equipment used need not be sophisticated or expensive.

For those readers who are already convinced of the importance of keyboard skills training, and wish to establish a training programme, the appendices contain information to help you.

One training scheme which reflects the ideas expressed in this paper is being operated at The Thomas Telford School, Shropshire. Following a period of staff keyboard training, 180 Year 7 pupils receive daily keyboard skills training for five weeks, using computer software. This initial training is reinforced by monitoring individual skill development and through application across the curriculum; further details of this programme are contained in Appendix B.

Appendix A reviews ten computer-based keyboard skills training programs, Appendix C compares six models for delivering training and Appendix D lists institutions which provide keyboard skills training for adult students.

I. Introduction

The integration of the typewriter with the computer assisted the development of business communication systems which have had a profound impact on modern civilization. This in turn has altered expectations and demands in relation to the education and training of young people, lately reflected by the emphasis on Information Technology (IT) contained in the National Curriculum and in statements of intent concerning the 16-19 curriculum. All pupils, irrespective of vocational intention, must now acquire a basic competence in the use of a variety of generic software applications, including text or word processing. From primary school to higher education, students will increasingly encounter what is known as the QWERTY keyboard as one of a range of inputting devices for a computer. Despite several brave attempts to introduce alternative keyboards, for example the Dvorak alternative keyboard which has a minority following in the USA, it is now generally recognized that QWERTY is the standard in the western world and that it will be with us for a long time.

The QWERTY keyboard typewriter, dating from 1868, led to the development of a method of text production known as 'touch typing', in which an operator employs all fingers and refrains from looking at the keyboard. By 1900, the all-finger method had become standard, and in the intervening decades the ability to use a typewriter at speed has been a highly marketable office skill, largely dominated by women. Levels of expertise were related to accuracy and speed of transcription from handwritten or printed copy, or from the dictation of a third party using a recording device.

The advent of computerized text editing has given rise to a new skill — that of generative or composition typing, as distinct from copy or transcription typing, in which the operator types his or her own ideas directly, and proceeds to edit the self-drafted documents. From this practice, which is becoming increasingly widespread amongst professionals at all levels of business, government, medicine, education, and so on, arises the need to acquire proficiency in text input. This has far-reaching implications for the nature of office employment in the next decade and beyond and calls for a radical change of attitude on the part of both educators and trainers.

The traditional view of typewriting courses as a haven for non-academic girls or as a pre-cursor to the secretarial vocational route, is no longer tenable. The advent of the electronic office and the escalation of communications technology is already impacting on the design of business premises and recruitment of staff. The popularity of personal computers and local area networks has led to the QWERTY keyboard being found throughout an organization, from the boardroom table to the production console and service areas. At the same time, many employment opportunities now relate to working from the home or from regional bases using electronic communication links. The acquisition of the touch typing skill has therefore

acquired a significance and a value far beyond the aspirations of the office worker, and this has created new interest in methods of learning and teaching what is a highly complex psycho-motor skill.

This document considers the current status of keyboard skills training within the secondary school curriculum, the strategies required to alter perceptions, and structures and resources needed to provide adequate keyboard skills training in schools. The appendices contain further information about delivery methods, training courses, keyboard skills training programs and a training scheme based on the ideas contained in this document which is currently being evaluated at the City Technology College in Telford, Shropshire.

II. The evolution of keyboard skills as a curriculum subject

Typewriting has been a subject option for senior pupils in many secondary schools since 1944, with a noticeable expansion during the ROSLA period of the 1970s. Firmly related to vocational aspirations, it was offered mainly to girls during the last two years of schooling. Initially, pupils were entered for vocational board examinations, but later a CSE examination in the subject was introduced, through which an attempt was made to broaden the syllabus.

With the introduction of the GCSE, typewriting as a subject began to disappear from the secondary school scene, to be replaced by a hybrid named Keyboarding Applications which was oriented less towards office work, and included considerable practical coursework. The increasing availability of computers allowed pupils to combine typewriting and word processing skills under this heading. It was, however, still perceived as an option largely for girls intending to move straight into office employment or secretarial courses in the Further Education sector. There has been an increase in the number of boys selecting the option in recent years, but examination entries remain predominantly female.

Within the last decade, business education courses for 'O' level, CSE and latterly the GCSE qualifications have altered radically. An emphasis on the integration of knowledge, skills and practice, the use of active learning and enquiry methods, and the refurbishment of classrooms as practical business education suites complete with boardrooms, mock offices and computers, have led to a diminution of the gender divide at 14. The replacement of manual typewriters by microstations, and the integration of IT as an element of business education courses has rendered obsolete rooms with serried ranks of manual typewriters and replaced them with business resource centres and enterprise areas.

Simultaneously, the rapid escalation of IT across the curriculum, and the increased number of computers to be found in schools, led many to recognize a need for pupils and teachers to acquire familiarity with the QWERTY keyboard. Pupils were offered Keyboard Skills as a component of IT courses, and teaching methods tended to be based on the traditional touch typing drills, using materials originally designed for adult office trainees.

The location of keyboard skills training as part of an IT introductory course which covered topics such as databases, word processors, spreadsheets, computer graphics and process control skewed many teachers' perceptions of IT and its application. The emphasis on keyboard skills as a pre-requisite to the use of IT was manifestly wrong, and acted as a strong deterrent to both teachers and pupils. As a result, the pendulum swung the opposite way and keyboard skills training was either dropped altogether or given token time; six sessions with a 3:1 pupil:keyboard ratio was not untypical.

Today, keyboard skills in many schools stands polarized between the new tokenism and the old vocationalism, neither of which can be said to meet the needs of young people. What is required is a systematic approach to the development of efficient text input skill in all pupils on entry to secondary school, reinforced through application across the curriculum and over time.

Resistance to the need for systematic keyboard skills training for all is often couched in terms of convenience or avoidance. Table 1 presents some of the typical negative attitudes which usually prevail in schools. If Britain is to have a workforce with skills which are appropriate for today's technological society, these attitudes must be changed radically and a more positive approach, such as suggested in Table 1, must be adopted.

III. The need for keyboard skills training in schools

Whether keyboard skills training in schools is needed or not can be divided into three issues: whether keyboard skills are needed at all, whether training in those skills should be structured rather than simply allowing regular access to computers, and at what stage in the education process such training should begin.

The need for keyboard skills

Use of a computer does not rely on QWERTY keyboards alone. The ability to recognize and use appropriately a range of input devices is fundamental to IT training. Where the QWERTY keyboard is critical, however, is in the drafting, inputting and retrieval of text and data. The belief of many that developing technology would soon make QWERTY redundant has so far proved unfounded; despite increasingly sophisticated synthesizers, mice,

Table 1. *Some typical negative approaches to keyboard skills training which prevail in schools, and their positive counterparts*

Negative approach	Positive approach
'It is boring!'	So is rote-learning, playing scales on a musical instrument, sports training, and a host of other activities which are accepted as justifiable in the pursuit of skill and excellence. It is a psycho-motor skill involving a high degree of hand, eye and brain co-ordination. It requires concentration, and the training process has been shown to improve individuals' concentration span.
'It turns pupils off computers!'	Use of the full range of input devices across the whole curriculum will counter any notion that 'computing' equals 'keyboarding'.
'It is an outdated skill. There are other ways of inputting text!'	Despite the ready availability of mice, scanners and voice synthesizers, the inescapable fact is that text is input most efficiently through an alphabetic keyboard, and QWERTY is the international standard (with the exception of Oriental/Arabic contexts).
'It is only suitable for girls!'	This is a relic of traditional gender divides between practical option choices, when CDT was offered to boys and Typewriting was offered to girls. The advent of the National Curriculum and the influence of TVEI has already altered this.
'I've never had keyboard training and I can manage quite well with two fingers!'	Managing quite well and managing efficiently are different. A person with one leg can travel a mile in due course, but the person with two legs covers the distance in greater comfort, less time, and still has energy left to devote to other work.
'Keyboard skills is training, not education. It has no place in the school curriculum!'	If IT is to be used by pupils as part of the tool kit to support learning, it is logical to equip them with the ability to access it as early as possible and as efficiently as possible.

scanners, and so on, it remains the standard text drafting tool and the main method of data input. Even menu-based systems which are very useful for novice or casual users are irritatingly slow for more experienced users; keyboard short-cuts allow an experienced user to interact with the system more quickly.

Since the ability to input and extract text and data is a basic pre-requisite to the use of IT, efficient use of this keyboard is as fundamental to a pupil's development of transferrable skills as handwriting.

Employers' opinions

Keyboard skills is near the top of the list of 'I wish I could ...' statements heard in industry today, and employers consistently include it in lists of qualities which they would consider to add value to any application. In a recent survey conducted by J. Michael Hawe for Thames-Chiltern Chamber of Commerce & Industry (1990) companies were questioned concerning new technology skills, and the overwhelming evidence from the replies points to the importance which industry places on keyboard skills. In this survey 600 companies, which were taken as representative of the 37,000 businesses in the Thames Valley area were approached and an average 37% response rate was achieved. Detailed figures for the number of companies approached and the response rates are given in Table 2, broken down by industry category.

Table 2. *Companies surveyed, broken down by industry category*

Industry category	Number of companies	Response rate (%)
1. Hi-Tech Manufacturing	110	53
2. General Manufacturing	180	39
3. Wholesale/Retail	90	31
4. Trade Services	90	30
5. Professional Services	130	31

An extract from the results of this survey is given below. It gives a clear indication of the value which employers place on keyboard skills for potential and current employees:

> Q. Are Word Processing skills equal in value to writing skills these days?
> ALMOST! is the resounding answer.

	Category of Company					
Response	1	2	3	4	5	Average
Yes	70%	40%	32%	20%	75%	47.4%
No	30%	60%	68%	80%	25%	52.6%

Q. Is touch typing an important skill for all employees?
The majority of companies thinks it is!

	Category of Company					
Response	1	2	3	4	5	Average
Yes	25%	65%	35%	68%	75%	53.6%
No	75%	35%	65%	32%	25%	46.4%

Q. Would you require touch typing for non administrative posts?
The preferences here are more closely related to the type of company.

	Category of Company					
Response	1	2	3	4	5	Average
Yes	60%	27%	20%	34%	75%	43.2%
No	40%	73%	80%	66%	25%	56.8%

Well over 40% of companies would require this specialised but universally useful skill.

Almost 100% of the companies surveyed said that keyboarding skills add value to an application.

Keyboard skills training for students with special needs

The advantage of word processed documents over handwritten ones is that a very high standard of text presentation can be achieved by everyone; the appearance of the final document does not rely on the author's ability to hold a pen and ruler. Use of a keyboard therefore has obvious advantages for students with motor disabilities which inhibit the normal development of handwriting. The ability to produce reports and essays which look as good as those from students who have no disabilities has a wonderful effect on the morale of less able students. In some cases, using a keyboard may be the only avenue through which the student's powers of self-expression can be liberated.

Anecdotal evidence also indicates that development of keyboard skills in young children has been associated with improved performance over a prolonged period in reading, spelling, vocabulary and written composition, in particular. For students with learning difficulties, acquiring the ability to use a keyboard often enhances their learning capacity considerably.

A student who is able to use a keyboard will be able to interact with a wide range of software packages, and therefore will be able to take full advantage of the recent advances in IT, from word processors to program generators,

and from data loggers to industrial process control systems. Clearly, training techniques which are appropriate for other students are unlikely to be suitable for students with special needs. However, keyboard mastery can bring many advantages to children who already endure serious disadvantages.

The need for structured training

No credible teaching practitioner would suggest that handing a child a pencil and leaving him or her to get on with it will culminate in an ability to write cursive script. Handwriting is a psycho-motor skill which takes many years of practice to develop with fluency. QWERTY keyboard operating is an extension of the handwriting skill which also requires dedicated time and practice. Its skill-complexity is well-documented, and research in the USA (Baddeley and Longman, 1978) has confirmed that learning is accomplished more quickly when the amount of training time is distributed over short and frequent sessions, carefully supervised. It is quite common, however, to claim that regular access to computers in classrooms such as the use of word processors during English lessons, will enable pupils to acquire keyboard proficiency over time, presumably by some sort of osmosis. Merely providing a pupil with a program of the 'zap-key' variety without regular diagnosis and mediation, may increase keyboard recognition response, but it is extremely unlikely to develop keyboard efficiency and will undoubtedly militate against its later acquisition, as conversion from the two-finger 'hunt and peck' method is notoriously more difficult.

There are three distinct stages in the skill development:

1. Recognition/accretion: student learns the position of the keys and the fingers associated with them.

2. Drill/tuning: student develops automatic anticipation of successive keystrokes and letter strings thereby gradually reducing time required between locating and striking individual keys; this is the longest stage, and depends on regular and constant application. Regression to 'hunt and peck' in this stage prevents further skill development.

3. Restructuring: intervals in student's former sequence of recognition-anticipation-execution decrease until there is overlap and re-organization of the various dynamic links between individual fingers, whole hand and arms. At this point, the keyboarding becomes automatic and fast, and can be recognized as skilled touch typing.

Learning to operate a QWERTY keyboard requires co-ordination of brain, eye and hand movements and involves a complex set of processes. Bad habits, resulting from incorrect use, can permanently impair keyboard proficiency.

Keyboard skills training in schools

The National Curriculum requirements for Technology expect all pupils to have a basic understanding of the capabilities of generic IT packages such as word processors, databases, spreadsheets and desktop publishing systems. Pupils are encouraged to use such software to produce project work, essays, and homework, as appropriate. At Key Stage 4 and beyond, however, the quantity of text often required will act as a deterrent to the use of such packages unless pupils are confident that their text input capacity is at least as rapid and as facile as handwriting.

The degree to which the generative typist must concentrate on the formulation of ideas and their translation into a linguistic code clearly demands that the bulk of conscious attention at this stage should not be devoted to the activity of text input itself. An early investment in keyboard skills training will thus liberate the student in the latter years of compulsory education, and after that in the workplace.

Ideally, a pupil should be introduced to the QWERTY keyboard layout and correct fingering techniques during primary education, building on the use of alphabet and words. Since finger-muscle power is no longer needed to depress keys, younger students may well be deemed to have a learning advantage over mature ones in that their fingers are smaller and more flexible, and once the correct techniques are mastered they will remain for life in much the same way as writing, piano playing and other psycho-motor skills which are acquired at an early age. In one approach to introducing technology into schools, devised at the Waterford Institute in the USA, touch typing is one of the first things taught to children in kindergarten (Heuston, 1989). The developers of this scheme claim that, six years after introducing the scheme into one school, a 40% improvement in test results for reading, writing and mathematics was achieved; regular gains of 50% might be possible for other schools. Given the low keyboard:pupil ratio available in most primary schools in this country, however, it would be unrealistic to expect skills training to commence before entry to secondary education.

Whether or not word processors should be used in examinations is a controversial issue. However, the escalation of keyboard skills training in schools will prepare students for this development which many people regard as inevitable.

IV. Training resources

Training methods

The methodology of QWERTY training provokes debates concerning the merits of the horizontal or vertical pattern, with tutors and instructors often favouring that which they themselves experienced.

The horizontal pattern is based on the centre row and home keys, with incremental development drills stemming from each home key.

The vertical pattern concentrates on the individual finger responsibilities, and covers each finger's territory as a whole. Its proponents argue that it gives trainees access to a wider choice of words sooner, but there is little to choose between them. Whichever pattern is chosen, repetitive drilling of letter combinations and word formations (technically known as digraphs/ trigraphs) is inescapable.

The use of visual and aural stimulus to aid the student at the accretion (key recognition) stage are matters for debate and choice. As an aid to motivation, at the very least they provide relief from the tedious monotony of drilling, but there is little evidence that they aid the learning process directly. At the same time, it must be recognized that the most successful industrial training systems in the UK include those which employ a combination of flashing coloured lights and audio tapes during the initial stage of training with large groups of students simultaneously working on blank keyboards. Progression from this initial stage varies according to aptitude, so individual taped lessons then take over, with the students using standard keyboards.

Some of the principles underpinning this approach are used in many of the inexpensive software packages available for keyboard familiarization. Utilized in a disciplined way, these can be extremely effective both for the initial training of students and for the conversion of two-fingered typists. These interactive programs vary from the 'Type-Invaders' game approach, for example 'shooting down' letters or beating the clock, to the 45-hour accuracy training designed for Post Office operatives. There is little to choose between them, apart from cost considerations and hardware compatibility. A selection of such programs is reviewed in Appendix A.

Support materials in this field have, however, been directed largely at adults and school-leavers, with an orientation towards office work or journalism. There are a number of quality typewriting manuals on the market, all focussed on the world of commerce and the requirements of vocational examinations. Sadly, there is a yawning gap between the materials produced for such secretarial training and those which adopt the interactive games approach. No research is yet available on the most effective ways of enabling younger students to develop keyboard skills, although one or two of the

packages reviewed in Appendix A do claim to cater to the needs of 'junior' typists.

Motivating young pupils to stay the course would suggest a more inventive approach to courseware than is currently available, with necessary drills and sequences enlivened by musical and visual stimulus appropriate to the age of the student. Typing to music would not, by any means, be innovative as this was a regular feature of training programmes until the 1960s when it lost favour with the move towards electronic typewriters.

Integrating keyboard skills training into the curriculum

Having accepted that keyboard skills training is needed in schools, the question arises as to how and where in the curriculum it might be delivered.

The commencement of secondary education is an ideal stage at which to start keyboard skills training. Year 7 pupils could experience intensive QWERTY introductory training (12-20 hours approximately) as part of their induction programme, to be subsequently and positively reinforced through use of word processors and other packages in all curriculum areas. Such introductory training should be supported by positive images of the benefits it brings to communication and presentation in a variety of walks of life, as well as to possible vocational applications.

Clearly, in the short term, there will also be a need to enable keyboard skills to be acquired by older students, according to demand and resourcing capacity, but a commitment to keyboard skills induction, training and reinforcement for Year 7 pupils will clearly pay dividends in a short space of time, from both the educational and vocational perspectives.

To QWERTY or not to QWERTY is not an IT skills debate, but a communication skills one, therefore it should not be considered as the sole responsibility of IT staff. Indeed, if initial training is to be reinforced effectively, the keyboard must be used in all curriculum subjects. As with any cross-curricular skill or dimension, it must be accepted as a responsibility of all staff members. This implies conscious acceptance of its worth as a life-skill for young people who will be living and working in a technological age, a recognition of its complexity, and a commitment to vigilance and supervision in the interests of the pupils' skill development.

Ideally, a teacher who has already acquired proficiency in keyboard skills would oversee the training programme, but probably the worst scenario is the one where it becomes the 'hobby horse' of one teacher and is barely tolerated by other staff. Training for keyboard skills is no more related to Business Studies, IT or English in the secondary school than it is to any other curriculum subject.

The provision of such a programme, whether in the short or long term, raises major problems of logistics. The availability of enough appropriate equipment, finding adequate time within a cramped timetable and providing adequate teacher supervision are all substantial difficulties which can only be resolved on an institutional basis.

Appendix B outlines how one City Technology College is building keyboard proficiency training into the induction programme for its Year 7 intake; many CTCs are now providing some keyboard training for Year 7 pupils. Several models for providing time within the timetable have been and are currently being tried, none of which are flawless; Appendix C compares six of these models. Curriculum planners may wish to customize one or more of these to suit their overall structure and timetable constraints.

In addressing the problems associated with the introduction of a training scheme, the following points should be remembered.

1. Training should take place on computer keyboards or simulators. Manual or electric typewriters are generally unsuitable for keyboard training of young children;
2. It is not necessary to have sophisticated or expensive equipment; any QWERTY computer keyboard is suitable for training pupils;
3. Initial sessions should be short and frequent;
4. Subsequent reinforcement of the effectiveness of full-finger operation in all situations where keyboards are used will be necessary to develop the skill.

It is worth reflecting that 400 hours of practice and 1,000 hours of experience are said to be required for ordinary people to become skilled and excellent respectively, in various sports which demand quick motor reflexes such as tennis and fencing. That a corresponding balance of practice and experience should be required to achieve a competent level of skill in the complex process of touch typing is quite apparent.

Clearly, not all students can achieve the high levels of speed and accuracy associated with the touch typist. What is desirable is competence and efficiency, neither of which can be achieved without conscious effort and investment of time.

One strategy for providing adequate keyboard skills training

The first step must be to develop a policy on keyboard usage which encompasses all students, all staff members and all curriculum subjects. If keyboard skills continue to be seen as a mere adjunct to the Business Studies or IT curricula, or as an irritating distraction from the real business of another curriculum subject, then the simple objective of making every student keyboard-competent will not be achievable.

Motivation depends greatly on recognition of the worth of the activity. Teachers and ancillary staff who themselves have not acquired, or do not

attempt to acquire, skills of this nature will not convince students of their importance. In a technology-rich environment, schools and colleges should seek to promote efficient use of equipment at all levels, thus leading by example.

The second step therefore is to allocate funding for crash courses for all existing staff and to include training as part of the induction programme for new staff so that the benefit of using eight fingers rather than two can be appreciated. The use of GEST funding for this purpose would be entirely appropriate. Appendix D gives details of organizations offering such courses. It has to be remembered, however, that unlearning the 'hunt and peck' method requires a considerable act of will and perseverence.

The third step is to enhance pupil motivation consciously through the promotion of positive images, for example people using keyboards efficiently in a range of occupations such as students, nurses, engineers, social workers, stock controllers, police, and so on. This requires careful attention to the use of incidental display material, and the recognition of opportunities to reinforce and value such skills throughout the curriculum. The fact that employers do value keyboard skills should also be articulated to the students.

Finally, the design and trialling of a co-ordinated induction and cross-curricular keyboard training scheme, with an appropriate recognition and reward element which would enable teachers and students to achieve this objective provides a challenge to educators and should be part of any ongoing action research strategy as long as the need remains.

V. Conclusions

In preparing young people for living and working in a society whose infrastructure depends increasingly on technological communication systems, schools have a responsibility to anticipate requirements and relate today's curriculum to tomorrow's needs, rather than to perpetuate vocational divisions which render whole groups of people underequipped to take advantage of new opportunities.

The use of communication tools, such as word processors and electronic mail, which rely on efficient text input and accurate use of alphanumeric keyboards has created a need for all young people to acquire a degree of keyboard proficiency. This will maximize their opportunity to access and utilize information at a speed and level unthinkable in previous eras of index cards, manual copying and transfer of data.

To prepare young people adequately to function within IT systems, keyboard skills training must be removed from the arena of 'office skills' and vocational training, and made available to all.

This has major implications for schools, colleges and producers of training materials, as the focus moves to younger clients and the market reflects vastly greater numbers than hitherto. In the short term, there will be considerable overlap with adult demand and re-training at all levels, but investment in keyboard training for pupils in schools will significantly alter the methods, format and support materials of a whole range of vocational training programmes in the foreseeable future, as young people emerge from secondary schooling equipped not only with a broad understanding of the application of technology, but with the ability to interface with it efficiently and confidently.

Research into effective training methods for these younger clients is urgently needed, and will undoubtedly emerge from those institutions which are prepared to grasp this particular nettle quickly.

In addition, the logistical and resource problems which will need to be solved in this connection are likely to have an impact on whole structures and cause many institutions to re-examine their curriculum policies.

Appendix A: Program reviews

Details of a limited number of keyboard skills training programs are provided in this appendix. The list is not exhaustive, but the programs have been selected to represent the range of features available — from simple fixed word and sentence drills to customized performance analysis and recording programs.

Whilst all perform the same function to a greater or lesser degree, their suitability for use with pupils of different ages and abilities varies. In choosing a program for use with the younger student, attention should be given to the length of sessions or lessons, clarity of graphic display, reading difficulty of text passages, devices for breaking up the monotony of drills, and the amount of encouraging feedback provided. The user comments quoted in this appendix should be considered carefully; they are all based on experience of teaching keyboard skills to children, mostly in a classroom environment.

The use of such courseware will not, of its own accord, bring about keyboard mastery unless it is within a planned programme which includes adequate monitoring. Sessions should be short, frequent and regular until knowledge of the keyboard layout and correct fingering have been established; this knowledge can then be reinforced by regular practice to increase accuracy and speed.

There are no short cuts to acquiring the skill of touch typing, and progress will be linked to motivation and span of concentration. Whilst encouraging perseverence in pupils to develop as high a skill level as possible, care should be taken to avoid situations where keyboard skills sessions become tedious and repetitive, with no evident progress. Programs which chart individual performance over several sessions, and which allow the teacher or administrator to monitor a group of students are clearly preferable to those which provide instant feedback only. Similarly, the introduction of games and competitions can help to break the monotony and enhance motivation.

No one program is likely to serve the needs of pupils in different age groups, and ideally teachers should be able to select from a range of tools, including non-software sources such as manuals, that which best fits individual pupil or situation need.

The following programs are reviewed in this appendix:

Accu-type II	19
All Fingers Go!	20
Iankey	21
Keyboarding Skills	22
Mavis Beacon Teaches Typing	23
Touch 'n' Go	24
Touch Type	25
Typing Instructor Encore!	26
Typing Tutor IV	27
Typequick	28

Program title: ACCU-TYPE II

User Comment:

> *'Designed for adult use, based on 5 hours per week and completion of course in 12 hours, this is an impressive program which offers a degree of flexibility. The text passages are more interesting than most, but not suitable for younger students or anyone with poor reading skills. This would be a good choice for open access models of delivery.'*

Availability:	Most IBM compatible computers.
Course structure:	20 levels, each containing six exercises; The program analyses individual performance, and the student is not permitted to move beyond a level until ready.
Special features:	Two entry points — complete beginners or 'brush-up' touch typist speed enhancement; An administrator's program allows access to all student records, showing last date of practice and individual progress reports; This program also enables the certification of students who have completed the course satisfactorily.
Drawbacks:	Screen layout rather cramped.
Obtainable from:	Accu-Tech Software Services, 119 High Street South, Rushden, Northants NN10 0RB.
Prices:	Single copy (5.25" or 3.5") £125 Site licence £225 (less 10% discount for education purchasers)

Program title: ALL FINGERS GO!

User Comment:

'A straightforward drills program with basic speed and error analysis at the end of each lesson. Perfectly adequate for the self-disciplined and motivated user, but lacks variety of stimulus necessary for many younger pupils.'

Availability:	IBM or IBM compatibles (except Amstrad);	
	BBC B and BBC Master.	
Course structure:	18 lessons, each consisting of two parts:	
	Part One introduces new keys and letter combinations, accompanied by visual keyboard demonstration;	
	Part Two provides eight sentence drills, repeated three times.	
Special features:	None. This is a straightforward training package heavily reliant on student self-discipline.	
Drawbacks:	Inflexibility of repetition feature;	
	Performance analysis limited;	
	Boring.	
Obtainable from:	National Extension College, 18 Brooklands Avenue, Cambridge CB2 2HN.	
Prices:	Single copy (5.25" or 3.5") Site licence or network (up to 25 machines)	£24.95 £399

Program title: IANKEY

User Comment:

'After initial sessions, younger students rapidly reach the boredom stage. Program lacks flexibility, but is adequate for the self-motivated and probably older student.'

Availability:	IBM and compatible PCs; Amstrad 1512/1640; RML Nimbus.
Course structure:	Eight lessons, each containing 25 exercises.
Special features:	Two separate programs available: Beginners and conversion course for two-finger typists (purchased separately).
Drawbacks:	Text passages rather long and unsuitable for younger students or those with poor reading ability.
Obtainable from:	Iansyst, Omnibus Building, 41 North Road, London N7 9OP. or Entek Training Services, The Mansion, High St, London N14 6BJ.
Prices:	Single Copy (5.25" or 3.5") £26.04 each course (Nimbus/Apricot £49, Amstrad £21.70) Site licence £11 per machine (less 20% discount to charities)

Program title: KEYBOARDING SKILLS

User Comment:

> *'Despite an irritating lack of wordwrap facility, I liked the simplicity of this package. For younger students, or those with reading difficulty, the short and simple sentences are ideal. Drills are also short, and teachers would need to ensure that they were repeated sufficiently often — particularly those which relate to the weaker fingers.'*

Availability:	IBM and compatible PCs; BBC B and BBC Master.
Course structure:	Eight alphabetic and three numeric sections, each with a basic drill, followed by reinforcement exercises and a 'random character' game.
Special features:	Short and simple sentences from the start; Straightforward performance analysis consisting of percentage keystroke error and words per minute count, with graphic display of keys needing more practice; Clear and uncluttered screen layout.
Drawbacks:	No wordwrap feature; No continual records possible, (but personal record card supplied with disk).
Obtainable from:	Pitman Publishing, 128 Long Acre, London WC2E 9AN.
Prices:	Single copy (5.25" or 3.5") £29.95 Site licence negotiable

Program title: MAVIS BEACON TEACHES TYPING

User Comment:

'As a typing tutor, this program is certainly the most comprehensive I have seen, both in its coverage and its analysis detail — to the point of overkill! Older students may find the tone patronising, but the constant encouragement and 'chat' phrases appeal to many younger learners, and the in-built flexibility and variety alleviates the boredom of repetitive drills.

On the down side, the lessons are rather long and the screen layout often appears cluttered.'

Availability:	IBM and compatible PCs; Apple Mac/II/IIGS.
Course structure:	Following introductory lessons for diagnostic purposes this program creates individualized lessons based on a comprehensive lesson by lesson performance analysis.
Special features:	Comprehensive performance analysis; (20 different graphics!); Choice of senior or junior language level after initial lessons; Musical on-screen metronome; 'Road Racer'— a speed typing game.
Drawbacks:	Lessons are rather long; Constant choice factor can be irritating for user.
Obtainable from:	The Software Toolworks Ltd, The Coach House, Hooklands, Scaynes Hill, Haywards Heath, W. Sussex RH17 7NG.
Prices:	Single Copy (5.25" or 3.5") £29.99 Site Licence negotiable (approximately £9 per machine.)

Program title: TOUCH 'N' GO

User Comment:

'Adequate for its purpose, but uninteresting. Younger students quickly become bored. Suitable for use with older students in open-access situation.'

Availability:	IBM and compatible PCs; Amstrad PCW and CPC6128.
Course structure:	A series of 62 drills, through which the program will not allow student to advance unless performance indicates readiness to proceed.
Special features:	Administrator's program allows access to individual student records.
Drawbacks:	Screen layout cramped; Drills rather long.
Obtainable from:	Paperback Software UK Ltd, The Widford Old Rectory, London Road, Chelmsford, Essex CM2 8TE.
Prices:	Single copy (5.25" or 3.5") £21.69 Site licence negotiable

Program title: TOUCH TYPE

User Comment:

> *'A very attractive package all round — superb graphics and sufficiently flexible for use with juniors and seniors alike. The use of visual and aural stimulus is very effective, and the ease of access to progress analysis makes this an ideal program for young learners.'*

Availability:	Acorn Archimedes; A3000.	
Course structure:	Three sets of practice files (45 exercises of varying lengths) — home keys, individual finger practice, general typing exercises.	
Special features:	Audio guide to keys in stereo (using headphones); All exercises can be edited or supplemented; Full print-out of exercises and analysis; On-screen metronome.	
Drawbacks:	Limited on-screen instruction for fingering.	
Obtainable from:	Iota Software Ltd, St John's Innovation Centre, Cowley Road, Cambridge, CB4 4WS.	
Prices:	Single copy Site licence	£34.74 (excl VAT) £138 (up to 10 machines); £259 (11 machines or more)

Program title: TYPING INSTRUCTOR ENCORE!

User comment:

> *'This program is very flexible, and gives excellent feedback on progress. It includes a game of the 'word-eating' variety which provides light relief from the necessary tedium of drilling. The comprehensive progress reports include speed and accuracy, as well as analysis of problem keys. Parameters can be re-set by teacher, and the facility to insert text is useful.'*

Availability:	IBM and compatible PCs;	
	Apple Macintosh.	
Course structure:	18 key location lessons at three levels;	
	15 speed and accuracy lessons;	
	12 tests with speed and accuracy scores;	
	Specific drills for common prefixes, consonant patterns and vowel patterns.	
Special features:	Analysis of errors produces mini-drills of problem combinations — useful for spelling practice!	
	Own test creation facility.	
Obtainable from:	Entek Training Services, The Mansion, High St, London N14 6BJ.	
Prices:	Single copy (5.25" or 3.5") Site licence/network	£39.95 (£49.95, Apple) £50 (25 machines)

Program title: TYPING TUTOR IV

User comment:

'The selection and progression of the lessons have been very well structured and the facility to record and monitor individual progress throughout the course is extremely useful.'

Availability:	IBM and compatible PCs; Apple II/IIGS.	
Course structure:	Commencing from identified level of experience (beginner/two-finger typist/touch typist); Customized practice exercises and tests are related to targets selected and ongoing performance analysis.	
Special features:	Letter invaders game; Instructor testing mode (password protected); Own test facility.	
Drawbacks:	American spelling is used.	
Obtainable from:	MGA Softcat, 41 Cinque Ports Street, Rye, E. Sussex TN37 7AD.	
Prices:	Single copy (5.25" or 3.5") Site licence negotiable	£49.95

Program title: TYPEQUICK

User comment:

> *'This is an excellent no-gimmicks program. The keyboard demonstration is one of the clearest I have seen on any program of this type. It is clearly structured, easy to use, flexible, and provides immediate feed-back and revision within lessons. The student data file includes dates of lessons, time spent, number of revisions, and feedback given. Although it lacks the variety of activity which can alleviate boredom for younger students, it has a flow and pace which make it comfortable to use. It will be particularly useful for open-access models of delivery.'*

Availability:

IBM and compatible PCs;

Apple Mac or Apple II.

Course structure:

10 lessons with 3 subcourses — keyboard, keypad, speed and accuracy, paced according to user-set targets;

Each lesson's objective is clearly stated;

Each lesson is followed by a progress review.

Special features:

Includes a useful support manual and an on-screen 'Inform Library' which contains information about use of computer;

Fast screen changes and flexible lesson parameters including shorter lessons and simple English for younger students;

'TQ Helpers' — raised adhesive key guides for home keys.

Obtainable from:

Comprix Ltd.,
PO Box 106,
Altrincham,
Cheshire WA15 9RX.

Prices:

Single copy (5.25" or 3.5")	£54
Site licence/network (3 years — renewable)	£385

Appendix B: Keyboard training scheme at The Thomas Telford School

Background

The Thomas Telford School opened its doors to students for the first time in September 1991. The initial intake comprised 180 Year 7 pupils (11-12 yr olds) and 90 Post-16 students.

The school is one of the City Technology Colleges established to provide a good grounding in all subjects of the National Curriculum, but with an emphasis on Mathematics, Science and Technology. Pupils will be expected to become computer literate through the use of computers in all subject areas, and from the age of 14 will spend as much as 60% of their time on Technology-related activities. It is the intention of the college that pupils will have access to laptop computers for homework purposes.

It is recognized by college management and staff that keyboard skills will facilitate the use of word processors across the curriculum and the following programme has been planned to provide such skills for Year 7 pupils during their induction period.

Planning stage

The following were identified as key features for successful keyboard skill development:

- The prior induction and training of all staff;
- An appropriate computer-based training course;
- Regular sessions for pupils within a concentrated period (e.g. induction weeks);
- Suitable homework practice exercises;
- End of initial course certification;
- Evaluation of skill achievement;
- Monitoring of further progress;
- Certification endorsement or extension.

The programme

Phase 1: All teaching staff receive a minimum of 12 hours keyboard training prior to the start of the school year, using a computer-based training course. TYPEQUICK, reviewed on the page opposite, was the course chosen for this scheme;

Phase 2: Using the same software, 180 Year 7 pupils receive one session per day (approximately 40 minutes) for a five-week induction period (25 sessions) reinforced by homework exercises to be undertaken with laptop computers. This is followed by assessment and certification by Pitman Examinations Institute;

Phase 3: Monitoring of individual skill development and application across the curriculum by all staff. Opportunities to re-access the training software at any time are available to staff and pupils.

Appendix C: Some models of delivery, Years 7-8

Method	Advantages	Disadvantages
1. One timetabled session per week for the first 12 to 18 weeks.	Relatively easy to timetable; Importance of keyboard skill established from beginning.	Intervals between sessions too great; High regression factor militates against skill development.
2. Keyboard skills located within English as part of 'use of word processing'.	Relevance of skill acquisition within a context can motivate.	Amount of time required is 'taken from' subject time, and therefore likely to detract from teacher commitment to skill development.
3. Concentrated crash course.	Frequent short sessions reduces degree of regression between sessions; Possible to timetable groups sequentially throughout the year.	Can create timetabling problems; Groups last in sequence likely to have developed incorrect fingering habits, difficult to correct.
4. Open access, individualized programmes.	Students can pre-book sessions to fit with their own timetables; Greater resourcing flexibility.	Difficult to monitor or mediate student progress; Keyboard skills can be seen as an optional extra; Heavily dependent on student motivation and self-discipline.
5. Flexible licencing scheme — three or more sessions of 1 hour per week, negotiated between teacher and student.	Greater resourcing flexibility; Negotiable short-term objectives.	Requires constant monitoring; Can create timetable problems.
6. Extra-timetable option (after school, lunch time, etc).	No timetabling conflicts.	Keyboard skills can be seen as optional and therefore unimportant.

Appendix D: Institutions offering keyboard skills training for adult students

1. Local Authority Further Education Institutions

(as listed in local directories)

Day and evening classes available in most establishments — usually linked to academic terms.

2. Sight & Sound Education Ltd

Offer a 'start any time' service all year round — self-paced tuition, with a wide range of courses including 'Breakfast keyboard training'!

College locations:

Bath	0225-460477
Birmingham	021-643-4746
Bristol	0272-266257
Edinburgh	031-662-0800
Glasgow	041-552-2595
Liverpool	051-236-7844
London (Charing Cross)	071-379-0691
London (Aldgate)	071-377-0301
Manchester	061-236-4358
Middlesbrough (Corporation Rd)	0642-248181
Middlesbrough (Riverside Park)	0642-232289
Sheffield	0742-701922
Stockton	0642-677600

3. Wetherby Training Franchises

Offer individualized training programmes to suit customer needs and timetables. There are 200 franchised agents nationwide; telephone Wetherby (0937) 583940 for details of nearest training agency.

References

Baddeley and Longman (1978) referred to in *Cognitive Aspects of Skilled Typewriting*, William E. Cooper (ed), Springer-Verlag, New York.

Heuston, D.H. (1989) *Leadership, computers and education*, available from The Waterford Institute, 3305 N. University Ave., Suite 200, Provo, UT 84604, USA.

Thames-Chiltern Chamber of Commerce & Industry (1990) *What do Employers want from Education?* compiled by J. Michael Hawe, available from Thames-Chiltern Chamber of Commerce & Industry, Commerce House, 2-6 Bath Road, Slough, Berks, SL1 3SB.

Previous titles in this series, available from the CTC Trust:

1. *Curriculum and resources: computer provision in a CTC* by Lawrence Denholm, ISBN 1 873882 00 9.

Price £7.50